

Coal and Other Power Systems

Funding Profile by Subprogram

(dollars in thousands)

FY 2004 Comparable Appropriation	FY 2005 Comparable Appropriation	FY 2006 Base	FY 2006 Request	FY 2006 Request vs Base	
				\$ Change	% Change

Coal and Other Power Systems

President's Coal Research Initiative

Clean Coal Power Initiative	173,811	67,055	67,055	68,000	+945	+1.4%
Central Systems.....	87,740	85,496	85,496	98,300	+12,804	+15.0%
Sequestration	39,375	45,361	45,361	67,200	+21,839	+48.1%
Fuels	30,376	32,147	32,147	22,000	-10,147	-31.6%
Advanced Research.....	37,533	42,699	42,699	30,500	-12,199	-28.6%

Total, President's Coal Research Initiative	368,835	272,758	272,758	286,000	+13,242	+4.9%
---	---------	---------	---------	---------	---------	-------

Other Power Systems

Distributed Generation Systems	69,234	77,386	77,386	65,000	-12,386	-16.0%
U.S./China Energy and Environmental Center	988	986	986	0	-986	-100.0%

Total, Other Power Systems...	70,222	78,372	78,372	65,000	-13,372	-17.1%
-------------------------------	--------	--------	--------	--------	---------	--------

Total, Coal and Other Power Systems	439,057	351,130	351,130	351,000	-130	-0.0%
---	---------	---------	---------	---------	------	-------

Mission

The mission of the Coal and Other Power Systems program is to assure the availability of abundant low cost, domestic energy (including hydrogen) to fuel economic prosperity and strengthen energy security.

Benefits

The Coal and Other Power Systems program supports DOE's mission to achieve national energy security in an economic and environmentally sound manner by developing the technological capability to dramatically reduce air pollution from coal-fueled electricity generation plants and carbon emissions to achieve essentially zero emissions. In the near term this means providing the capability to meet all existing and anticipated environmental regulations at low cost and to increase the power generation efficiency for existing and new plants. In the longer term, the aim is to nearly double energy plant efficiencies (from 33% to 60%), create the capability to achieve zero-emissions in producing low cost

hydrogen from coal and sequester (capture and store) all carbon from future coal plants at affordable costs of electricity, allowing coal to remain a key, strategic fuel for the Nation. The program mission is carried out in support of several Presidential Initiatives including the Coal Research Initiative, Clear Skies Initiative, Global Climate Change Initiative, Hydrogen Fuel Initiative, and the FutureGen Initiative.

Background

President's Coal Research Initiative

The goal of the President's Coal Research Initiative is to produce public benefits by conducting research and development on coal-related technologies that will improve coal's competitiveness in future energy supply markets. The Administration strongly supports coal as an important part of our energy portfolio. This request carries out the President's campaign commitment to invest \$2 billion on clean coal research over 10 years.

The President's Coal Research Initiative consists of the Clean Coal Power Initiative, which embodies both an industry-led, cost-shared research and development program, and FutureGen, a prototype facility that will produce electricity and hydrogen while sequestering one million metric tons of carbon dioxide per year; Central Systems, targeting central station power generation equipment including low cost emissions control technology (especially mercury), turbines, and gasification technology; Sequestration R&D, researching ways to mitigate or separate and dispose of greenhouse gas from combustion; and Advanced Research, a set of cross-cutting long-term research projects that can potentially contribute to many aspects of the coal research program. Each of these programs is described in detail in separate sections below.

Other Power Systems

Distributed generation is the strategic application of relatively small generating units (typically less than 30 MWe) at or near consumer sites to meet specific customer needs, to support economic operation of the existing power distribution grid, or both. Power line losses are considerably reduced. Reliability of service and power quality is enhanced by proximity to the customer and efficiency can be improved in some on-site applications by using the heat from power generation.

The Distributed Generation Program contributes to two of the energy challenges that are being addressed in the National Energy Strategy: (1) improving the environmental acceptability of energy production and use by improving the efficiency and economics of power generation through the use of advanced technologies, and (2) increasing the competitiveness and reliability of U.S. energy systems. This is achieved through the strategy of encouraging the development and deployment of distributed power technologies to satisfy market forces for smaller, modular power technologies that can be installed quickly, close to consumer demand centers.

The technology developed in the Distributed Generation program is expected to be scaled-up for use in the FutureGen project, and eventually to provide ultra-high, ultra-clean, large scale modules for zero emissions plants.

Strategic and Program Goals

The Department's Strategic Plan identifies four strategic goals (one each for defense, energy, science, and environmental aspects of the mission) plus seven general goals that tie to the strategic goals. The Coal and Other Power Systems program supports the following goal:

Energy Strategic Goal

General Goal 4: Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The Coal and Other Power Systems program has one program goal which contributes to General Goal 4 in the "goal cascade".

Program Goal 04.55.00.00: Create public/private partnerships to provide technology to ensure continued electricity generation and hydrogen production from the extensive U.S. fossil fuel resource (especially coal), including control technologies to permit reasonable-cost compliance with emerging regulations, and ultimately, by 2015, zero emission plants (including carbon) that are fuel-flexible, and capable of multi-product output and efficiencies over 60 percent with coal and 75 percent with natural gas.

Contribution to Program Goal 04.55.00.00 (Zero Emissions Coal-Based Electricity and Hydrogen Production)

- The Clean Coal Power Initiative subprogram by 2010 will initiate demonstration of advanced coal-based power generation technologies capable of achieving 45 percent electrical efficiency, with environmental and economic performance capable of achieving greater than 90 percent Hg removal at a cost of 70 percent of current technology, less than 0.15 lb/MMBtu NO_x at 75 percent of the cost of current technology (selective catalytic reactors), that can be configured to co-produce heat, fuels, chemicals or other useful byproducts; and, provide a deployment-ready suite of advanced technologies that can produce substantial near-, mid-, and long-range economic and environmental public benefits.
- The FutureGen research prototype facility, within the Clean Coal Power Initiative subprogram, will prove the technical feasibility and economic viability of the zero emissions (including carbon) coal concept.
- The Innovations for Existing Plants activity, within the Central Systems subprogram, supports the President's Clear Skies Initiative by having technologies ready for commercial demonstration by 2007 with the potential to reduce, for all coals: mercury by 50-70 percent at 70 percent of today's cost of \$50,000-\$70,000/lb of mercury; NO_x to less than 0.15 lb/mmBtu at three-quarters of the cost of selective catalytic reactors (SCR), which is currently \$80-\$100/Kw; PM_{2.5} by 99.99 percent for less than \$50-\$70/Kw; and acid gases by 95 percent. By 2010, test technologies for advanced cooling, mercury reduction by 90 percent at 70 percent of today's cost of \$50,000-\$70,000/lb. of mercury; and a 66 percent increase in byproducts utilization.

- The Advanced Power Systems activity, within the Central Systems subprogram, will, by 2010, complete R&D for advanced gasification combined cycle technology that can produce electricity from coal at 45-50% efficiency (HHV). By 2012, complete R&D to integrate this technology with CO₂ separation, capture and sequestration into a zero-emission configuration(s) that can provide electricity with less than a 10% increase in cost.
- The Sequestration subprogram, by 2007, will demonstrate at a pilot plant scale, technologies to reduce the cost of carbon separation and capture from new coal-based power systems by 75 percent compared to current systems (\$200/tonne carbon in year 2000). By 2012, develop technologies that result in less than 10 percent increase in the cost of new energy services to separate, capture, transport, and sequester carbon using either direct or indirect systems.
- The Fuels subprogram, by 2010, will complete development of modules capable of co-producing hydrogen from coal at \$30/barrel crude oil equivalent (no incentives or tax credits) when integrated with advanced coal power systems.
- The Advanced Research subprogram sustains U.S. preeminence in fossil fuel technology by supporting development of materials, computational method, and control system knowledge needed to bridge gaps between science and advanced engineering. Advanced Research efforts will allow development, by 2010, of enabling technologies that support the goals of zero-emissions energy (FutureGen) systems.
- The Distributed Generation Systems subprogram, by 2010, will increase the robustness of distributed generation and thereby lower vulnerability of the electricity grid by introducing prototypes of 3-10 kilowatt solid oxide fuel cell modules with 10-fold cost reduction versus 2003 baseline (\$400/Kw), with 40-60 percent electrical efficiency adaptable for zero-emission coal systems.

Annual Performance Results and Targets

FY 2001 Results	FY 2002 Results	FY 2003 Results	FY 2004 Targets	FY 2005 Targets	FY 2006 Targets
-----------------	-----------------	-----------------	-----------------	-----------------	-----------------

Program Goal 04.55.00.00 Zero Emissions Coal-Based Electricity and Hydrogen Production

Clean Coal Power Initiative

No targets reported

No targets reported

Complete CCPI Round 1 solicitation, proposal evaluations and project selections to assemble the initial portfolio of advanced technologies capable of improving the economic and environmental performance of coal-based electric power generation facilities. (MET GOAL)

Complete NEPA process for 3 out of the 6 active PPII projects and initiate construction or operations phases for several of the projects. (NOT MET)

Complete sufficient implementation activities on remaining projects to resolve any barrier issues. (MET GOAL)

Make go/no go decisions regarding award of cooperative agreements for up to 5 Round 1 CCPI projects and issue a Round 2 CCPI solicitation. (GPRA 4.55.6.1 – MET GOAL)

Initiate 100% of the active industrial projects selected under the first round of the competitive CCPI solicitation and make project selections from the second round CCPI solicitation. (GPRA 4.55.6.1)

Make go/no go decisions regarding award of cooperative agreements for all projects selected under Round 2 CCPI.

Issue/release the FutureGen Project Draft Environmental Impact Statement.

Central Systems

Deliver to EPA 2 years worth of high-quality PM_{2.5} ambient monitoring data from the upper Ohio River Project. (MET GOAL)

Issue request for proposals for the commercial scale demonstration of technologies to assure the reliability of the Nation's energy supply from existing and new electric generation facilities. (MET GOAL) Demonstrate hydrogen and CO₂ separation from syngas to meet the long-term goals of providing low-cost hydrogen

Complete Phase I report characterizing concentration and composition of ambient PM_{2.5} emissions as input to the EPA PM_{2.5} National Ambient Air Quality Standards (NAAQS) review. This data will help identify the impact of emission sources on air quality. (MET GOAL)

Complete initial tests of the IGCC transport gasifier to confirm the feasibility of the technology to significantly improve reliability, cost effectiveness, and efficiency for

Initiate projects for developing technologies to address emerging electric utility/water issues and combustion byproducts utilization and disposal. (MET GOAL)

Complete preliminary field testing of alternative mercury control technologies representing two approaches for achieving 50% or greater removal. (MET GOAL)

Complete fine particulate monitoring in the Upper Ohio River Valley region; complete

Complete bench- and pilot-scale testing of five novel mercury control concepts capable of achieving ≥90% mercury capture by 2010 and initiate seven new projects under second phase of field testing of mercury control technology capable of achieving 50-70% mercury capture. (GPRA 4.55.1.1 – MET GOAL)

Complete Ion Transport Membrane (ITM) designs with target oxygen production of 95% purity, to obtain engineering data for further

Develop field performance and cost data for emission control technologies and establish baseline for emissions transport from coal-fired boilers in support of proposed mercury and air quality regulations. (GPRA 4.55.1.1)

Begin construction of slipstream test units, test planning, and testing of advanced gas cleanup concepts using real coal-derived synthesis gas. In FY 2005, the Gasification Technologies program will move ultra-clean cleanup, including economical

Conduct initial pilot scale slipstream field test of at least one technology capable of 90% mercury removal.

Begin construction and testing of advanced gas separation technologies. In FY 2006, the Gasification Technologies program will move gas separation, including ceramic membrane, hydrogen separation, CO₂ hydrate formation and ceramic membrane air separation, closer to commercialization, eventually leading to capital

**Fossil Energy Research and Development/
Coal and Other Power Systems**

FY 2006 Congressional Budget

FY 2001 Results	FY 2002 Results	FY 2003 Results	FY 2004 Targets	FY 2005 Targets	FY 2006 Targets
<p>for high-efficiency fuel cells, and for providing concentrated CO₂ streams for sequestration. (MET GOAL)</p> <p>Complete design and continue construction of Circulating Atmospheric Fluidized Bed demonstration project at Jacksonville, Florida. (MET GOAL)</p>	<p>producing electricity and other products. (MET GOAL)</p>	<p>field testing of alternative particulate matter collection technologies representing at least two approaches for achieving 99.99% removal; initiate research on PM_{2.5} and mercury transport and deposition. (MET GOAL)</p> <p>Initiate developmental testing of SCR catalysts for reducing NO_x emissions from alternatively fueled boilers. (MET GOAL)</p> <p>Establish a 1-5 tpd facility capable of determining engineering feasibility, defining technical performance, and establishing operating costs for oxygen separation using membrane technology. (MET GOAL)</p> <p>Complete initial laboratory-scale performance testing of hydrogen separation membranes using simulated gas streams. (MET GOAL)</p> <p>Complete initial laboratory tests to determine performance capabilities of sorbents, sieves, and membranes for removing mercury, sulfur, nitrogen, and CO₂ from gas streams. (MET GOAL)</p> <p>Conduct gasification support tests on leachability of gasifier residues, improved refractories, and oxygen-blown gasification of alternative fossil fuel feedstocks, and develop a simulator for a Vision 21 plant. (MET GOAL)</p>	<p>technology scale-up, ultimately leading to cost reductions of \$75-\$100/KW, and efficiency improvements of 1-2 points by 2010. (GPRA 4.55.2.1 – NOT MET)</p> <p>Complete at least 250 hours of high efficiency desulfurization process units operating with coal-derived synthesis gas. Eventual process units improvements are targeted to contribute a 60-80 \$/KW capital cost reduction and a 1 point efficiency gain to the gasification system performance by 2010. (GPRA 4.55.2.3 – NOT MET)</p> <p>Initiate testing on advanced hydrogen separation membranes in simulated coal gasification product streams and complete design of a hydrate pilot-scale slipstream test unit. Advanced hydrogen separation technologies target eventual sequestering of CO₂ with a less than 10% increase in electricity cost by 2012. (GPRA 4.55.2.2 – MET GOAL)</p> <p>Perform modeling, facility modifications, and conduct pilot-scale tests for identifying technology opportunities to increase reliability, improved performance and increased feed flexibility of advanced gasifiers. Gasification improvements target eventual capital cost reductions and a 90% single train availability by 2010. (GPRA 4.55.2.4 – MET GOAL)</p>	<p>and efficient sulfur removal and/or multi-contaminant cleanup, a significant step closer to commercialization, eventually leading to capital cost reductions of \$60-\$80 kW and efficiency improvements of >1 efficiency points and the turbine technology area of Advanced Power will show progress towards the contribution of 2-3 percentage points improvement in combined cycle turbine efficiency. (GPRA 4.55.2.1)</p>	<p>cost reductions of \$60-\$80 per kW from the baseline of \$1200/kW for IGCC systems and efficiency improvements of >1 efficiency points.</p> <p>Initiate a prototype combustor module test for large frame engines of low NO_x combustion technology (trapped vortex, catalytic, lean premix, or modified diffusion flame) using simulated coal based synthesis gas to demonstrate progress towards a 3 ppm NO_x emissions goal.</p>

FY 2001 Results	FY 2002 Results	FY 2003 Results	FY 2004 Targets	FY 2005 Targets	FY 2006 Targets
		<p>Develop technical and cost information sufficient for DOE decision-making on the viability of proceeding with plans for construction of a co-production plant. (MET GOAL)</p> <p>In the area of advanced systems initiated work on gas turbine combustor and nozzle systems for fuel flexible low-NO_x performance in IGCC applications for designs that are capable of meeting Vision 21 performance requirements. (MET GOAL)</p> <p>Continued technology base development in the areas of thermal barrier coatings, emission reductions, combustion stability, heat transfer and aerodynamics in turbines for coal derived synthesis gas. (MET GOAL)</p>	<p>Perform a thermal analysis of syngas turbine blades, initiate testing of an H2 delivery system, and perform a systems study of an optimized IGCC turbine design. Ultimately by 2008 these and follow-on efforts will reduce IGCC NO_x emissions to less than 3 ppm, reduce turbine cost by 10-20% by increasing specific power output, increase turbine firing temperature and combined cycle integration to improve efficiency by 2-3 percentage points and reduce emissions associated with high hydrogen fuels. (GPRA 4.55.2.5 – MET GOAL)</p>		
<p>Sequestration R&D</p> <p>For carbon sequestration, expand the number of possible cost effective, collaborative, multi-national applied R&D options carried to the Aproof-of-concept@ stage. Complete multiple field experiments on promising technologies. (MET GOAL)</p>	<p>Complete the injection of 2,500 tons of CO₂ into a depleted oil reservoir to monitor the transport of CO₂ and verify predictive geologic models on reservoir integrity. (NOT MET)</p>	<p>Complete initial set of field tests of advanced monitoring and verification methods for carbon inventories on natural and engineered terrestrial systems and establish a database for mid-continent planning of geological storage projects. (MET GOAL)</p> <p>Initiate evaluations of three novel concepts, comprising integrated sequestration with enhanced coal bed methane recovery, mineral carbonation, and CO₂ flooding during enhanced oil recovery and establish initial recommendations for long-term</p>	<p>Design and test multiple concepts for efficient, low-cost, advanced CO2 separation and capture including on oxy-fuel combustion, membranes, and hydrates for CO2 separation. Conduct field activities that evaluate sequestration opportunities in depleted oil reservoirs and saline aquifers. Collaboratively explore with the National Academy of Sciences novel and revolutionary means of storing greenhouse gases. This portfolio of over 22 projects targets reducing the cost of carbon dioxide separation and capture by 75% by 2012 compared to year 2000</p>	<p>Complete at least two pilot scale tests on emerging advanced capture technologies related to oxyfuel, sorbents, membranes or hydrates. (GPRA 4.55.3.1)</p>	<p>Select and award two or more Phase II Regional Carbon Sequestration Partnerships that will begin to evaluate regional infrastructure and technologies to permanently sequester greenhouse gas emissions through small scale validations tests.</p>

FY 2001 Results	FY 2002 Results	FY 2003 Results	FY 2004 Targets	FY 2005 Targets	FY 2006 Targets
		<p>monitoring of CO₂ geological storage to assure acceptability as a safe, long-term storage option. (MET GOAL)</p> <p>Complete initial planning, field testing, or analyses of sequestration concepts involving saline aquifer storage, ocean storage, and scientific feasibility of CO₂ storage as hydrate on the ocean floor, and complete initial comparative evaluation of energy technology scenarios to identify promising concepts for CO₂ sequestration. (MET GOAL)</p>	<p>systems. (GPRA 4.55.3.1 – MET GOAL)</p> <p>Develop instrumentation and initiate field tests of advanced monitoring and verification methods for carbon inventories for geologic and terrestrial sequestration. Complete a database for mid-continent geological storage projects and initiate a framework for U.S. wide project planning. Through regional partnerships, begin U.S.-wide infrastructure development of MMV protocols for carbon accounting to ensure permanence of long-term storage of CO₂. (GPRA 4.55.3.2 – MET GOAL)</p>		
<p>Fuels</p> <p>No targets reported.</p>	<p>Tests to determine ceramic membrane performance in laboratory-scale apparatus are complete. The ITM H₂/Syngas project has now tested five membranes, each of which has been operated for over six months at high pressure. Tests confirmed the selection of membrane materials and provided data for performance models. Additional laboratory-scale testing of catalysts and membrane stability will continue in support of pilot-scale operations and future commercialization. (MET GOAL)</p>	<p>Complete development and communication of a hydrogen program and implementation plans. (MET GOAL)</p>	<p>Prepare and communicate a Hydrogen from Coal R&D program strategy and develop solicitation research guidance for technology innovation to reduce the cost of producing hydrogen from coal. (GPRA 4.55.5.1 – MET GOAL)</p>	<p>Complete analysis and continue compilation of data derived from hydrogen separations research and document in the Hydrogen from Coal RD&D Plan. These will be in a format that can be used as the basis for developing industry standards needed to design and operate commercial-scale separation technology. (GPRA 4.55.5.1)</p>	<p>Develop industry standards for the design and operation of a commercial-scale advanced hydrogen separation system, identify such standards and requirements in the RD&D plan, and conduct initial tests of a prototype unit to validate design parameters.</p>
<p>Advanced Research</p> <p>No targets reported.</p>	<p>No targets reported.</p>	<p>Prepare and evaluate novel sensors and new materials for high temperature, oxidative environments to improve control, increase efficiency and performance, and/or achieve</p>	<p>No targets reported.</p>	<p>No targets reported.</p>	<p>No targets reported.</p>

FY 2001 Results	FY 2002 Results	FY 2003 Results	FY 2004 Targets	FY 2005 Targets	FY 2006 Targets
		lower emissions of CO ₂ and other pollutants. (MET GOAL)			
Distributed Generation Systems Begin testing of a 300 kw - 1 MW solid oxide fuel cell/turbine hybrid commercial prototype for distributed power applications (MET GOAL)	Complete demonstration of a commercial-scale, 250 kw molten carbonate fuel cell (MCFC) power plant system. This test will verify the commercial design for the MCFC technology for the combined heat and power (CHP) or distributed generation (DG) market and, if successful, will justify the construction of a MCFC manufacturing facility in the U.S. (MET GOAL)	Communicate fuel cell program objectives and results and conduct peer-reviews through conferences, workshops, and web-site tools. Manage the PSPG R&D portfolio through assessment of results and selection of new projects to fill portfolio gaps. (MET GOAL)	Relative to FY 2003 baseline of 145mWatt/cm2 power density @800C, demonstrate a 20% improvement in fuel cell stack power density for Solid State Energy Conversion Alliance (SECA) system design. (GPRA 4.55.4.1 – MET GOAL)	Begin prototype validation of technical requirements for low-cost SECA fuel cell systems. Test at least one prototype capable of achieving SECA cost reductions and efficiency Phase I goals. (GPRA 4.55.4.1)	One or more SECA industry teams complete phase I prototype validation demonstrating SECA phase I efficiency and cost goals.
Begin construction of a one MW solid oxide fuel cell (SOFC) hybrid. (NOT MET)		Conduct field tests necessary to establish feasibility of high temperature fuel cell hybrids and novel systems, including design, procurement, construction, and testing. (MET GOAL)	Relative to FY 2003 baselines of 900 for cathode performance and 174 for interconnect performance in area specific resistance units of mohms-cm2 @750C, complete 20% improvements in cathode performance and in the service life of electrical interconnect s and transfer technology advances to the SECA industry teams to facilitate systems cost reduction and efficiency goals of \$400/kW and 40-60 percent. Annual stakeholder workshops and semi-annual peer reviews will communicate progress and define future R&D requirements. (GPRA 4.55.4.2 – MET GOAL)	Under the SECA Core Program, validate one new sealing concept; 20% improvement in metallic interconnect performance relative to FY 2004; and 20% sulfur tolerance relative to FY 2004. These validations will aid SECA industry teams in achieving cost reduction and energy efficiency goals. (GPRA 4.55.4.2)	Incorporate seal and interconnect concepts into fuel cell stacks and perform initial tests.
		Conduct cost reduction R&D programs involving near-term developers, Siemens Westinghouse and Fuel Cell Energy, for the fuel cells, including manufacturing and balance of plant (BOP) components. (MET GOAL)			
		The SECA industrial teams shall conduct stack design and testing, including manufacturing approaches, and materials and balance of plant (BOP) systems optimization leading to the demonstration of prototypes. (MET GOAL)			
		Conduct contracted and in-house SECA core technology of crosscutting and proof-of-concept R&D for transfer to one or more industrial teams, including know-how, patents,			

FY 2001 Results	FY 2002 Results	FY 2003 Results	FY 2004 Targets	FY 2005 Targets	FY 2006 Targets
-----------------	-----------------	-----------------	-----------------	-----------------	-----------------

licenses, reports, papers in peer reviewed journals, etc. (MET GOAL)

Program direction will not exceed 18 percent of the total Fossil Energy R&D budget during any fiscal year.^a

^a This efficiency goal applies to total Fossil Energy R&D funding, of which Coal and Other Power Systems is a part.

Means and Strategies

The Coal and Other Power Systems program will continue to promote a strategy in power systems R&D that incorporates a focused and collaborative effort between government and industry to achieve the environmental and economic goals of the technologies. It will continue its dissemination of information and data and build on government-industry partnerships to commercialize clean coal technologies. For carbon sequestration, the program will continue to work with domestic and international partners to complete field experiments on promising options.

The Coal and Other Power Systems program will use various means and strategies to achieve its program goals. However, various external factors may impact the ability to achieve these goals. The program also performs collaborative activities to help meet its goals.

For all activities, DOE will work collaboratively with other government and industry partners, and participate cooperatively with other countries, for example, through the International Energy Agency in the Greenhouse Gas (IEAGHG) R&D Program and the Clean Coal Technology Center. Significant cost-sharing opportunities are possible through existing and new research agreements.

Program results may be affected by: world prices for competitive feedstocks and energy technologies; new and evolving environmental regulations; or any new legislation, in particular, new legislation related to CO₂ and air pollutants that affect coal and gas use. Also, industry restructuring/deregulation issues and uncertainties will continue to challenge coal use. Program results may be particularly affected by both evolutionary and revolutionary approaches to carbon sequestration.

Validation and Verification

The program and projects contained within this goal will be evaluated by peer review at annual contractor meetings and other forums. In addition, program benefits are estimated using macroeconomic and detailed industry-specific models. Modeling assumptions and methods are reviewed externally and the results are compared to results from other programs to determine the best application of R&D resources.

To validate and verify program performance, FE will conduct various internal and external reviews and audits. FE's programmatic activities are subject to continuing review by the Congress, the General Accounting Office, the Department's Inspector General, the National Research Council, the U.S. Environmental Protection Agency, state environmental and health agencies, , and the Department's Office of Engineering and Construction Management. Each year, the Office of Engineering and Construction Management conducts external independent reviews of selected projects. In addition, various Operations/Field Offices commission external independent reviews of site baselines or portions of the baselines. Additionally, FE Headquarters senior management and Field managers conduct quarterly, in-depth reviews of cost, schedule, and scope to ensure projects are on-track and within budget.

Program Assessment Rating Tool (PART)

The Department implemented a tool to evaluate selected programs. PART was developed by OMB to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. The structured framework of the PART provides a means through which programs can assess their activities differently than through traditional reviews. The Coal and Other Power Systems program has incorporated feedback from OMB into the FY 2006 Budget Request and has taken or will take the necessary steps to continue to improve performance.

The Coal and Other Power Systems program had the President's Coal Research Initiative and Other Power Systems areas PART reviewed separately. In the Purpose, Strategic Planning, and Program Management sections of the PART, OMB gave the Other Power Systems relatively high scores of 80, 70, and 88 respectively while the President's Coal Research Initiative score some what lower at 60, 67, and 75 respectively. In both the FY 2004 and FY 2005 PARTs, most points have been lost in the Program Results/Accountability section.

The Coal and Other Power Systems program has incorporated feedback from OMB during into the FY 2006 Budget Request. In addition to working at the Fossil Energy level to develop a framework for analyzing cost and benefits for R&D investments (see Overview section), the program has provided OMB with briefings and reports on assumptions used to calculate projected benefits. OMB chose not to review the FY 2006 PART for the Coal and Power Systems program.

Funding by General and Program Goal

(dollars in thousands)

FY 2004	FY 2005	FY 2006
---------	---------	---------

General Goal 4, Energy Security

Program Goal 04.55.00.00, Zero Emissions Coal-Based Electricity and Hydrogen Production

Clean Coal Power Initiative	173,811	67,055	68,000
Central Systems	87,740	85,496	98,300
Sequestration R&D	39,375	45,361	67,200
Fuels.....	30,376	32,147	22,000
Advanced Research.....	37,533	42,699	30,500
Distributed Generation Systems.....	69,234	77,386	65,000
U.S./China Energy and Environmental Center.....	988	986	0
Total, General Goal 4 (Coal and Other Power Systems).....	439,057	351,130	351,000